REMARKS

Applicants respectfully request reconsideration of this application. Claims 1, 2, 4, 5, 7-14, 17, 19-34, 36-49, and 51-88 remain in this application. Claims 1, 5, 7, 8, 11, 13, 14, 17, 19-21, 28, 29, 33, 34, 37, 39, 40, 45, 49, 56-58, 60, 61, 66, 70, 76, and 84 have been amended. Claims 3, 6, 15, 16, 18, 35, and 50 have been canceled. No claims have been added

Rejections under 35 U.S.C. § 103(a)

Claims 1, 2, 4, 7, 11-12, 14, 17, 20, 24-27, 33, 36, 39, 43, 60, 65-67, 73-74, and 76-79 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho et al. ("A Novel Distributed Control Protocol in Dynamic Wavelength-Routed Optical Networks", IEEE Communications Magazine, November 2002) and Smith et al., U.S. Patent No. 7,171,124. Applicant does not admit that Smith is prior art and reserves the right to swear behind these references at a later date. Nonetheless, Applicant respectfully submits that Ho and Smith does not disclose each and every element of the invention as claimed in claims 1, 2, 4, 7, 11-12, 14, 17, 20, 24-27, 33, 36, 39, 43, 60, 65-67, 73-74, and 76-79.

Ho discloses dynamically allocating an optical path from a source node to a destination node (Ho, Abstract, p.38). The source node is provided with a routing table that defines all possible paths to the different destinations nodes (Ho, p.39, 2nd column). The paths of the routing table are known to the source node because the paths are defined offline (Ho, p. 39, 2nd column). Ho's path allocation scheme dynamically updates the link status of multiple paths from the source node to the one destination node (Ho, p. 39, 2nd column). The link status of each link of a node on the paths is determined by either periodically sending probe messages along the paths or sending the probes messages in response to a path allocation request (Ho, p. 39, 2nd column). Assigning the proper path involves selecting the path and selecting the proper wavelength along the path (Ho, p. 38, 1st column). Because all of the routing between the source and destination nodes is predefined in the routing table, path selection just involves wavelength selection (Ho, p. 39, 2nd column). Wavelength selection selects the best lightpath between the source and

destination nodes (Ho, p. 39, 2nd column). This is done by determining critical links (i.e. paths with high traffic), and broadcasting to other nodes to avoid the critical links during path selection (Ho, p. 40, 2nd column). Nevertheless, Ho does not disclose the organization of the routing database, other that the database contains paths between source and destination nodes.

Smith discloses a system that routes and switches information on a dense wavelength division multiplexing network (DWDM) path between a source and destination node (Smith, Abstract). They system routes and switches information through multiple nodes in the network (Smith, Fig. 1, Col. 4, lines 13-22). Regenerating nodes ("regenerators") provide optical-electric-optical (OEO) wavelength conversion and/or regeneration in the network core (Smith, Col. 4, lines 34-36). The system further includes a network topology database to store topology data of the network (Smith, Col. 6, lines 65-66). In response to a request for connectivity from one source node to one destination node, the system finds a number of paths available between that source and destination node (Smith, Col. 6, lines 12-16). The system builds a search tree of these source-destination paths from the topology data stored in the database (Smith, Col. 6, lines 65-66). The search tree is organized by regenerator levels from the source node to other nodes along the paths to the destination node (Smith, Figure 5A, Col. 19, line 58 – Col. 10, line 11). Using this search tree, the system further selects viable paths in the search tree groups the paths by the number of regenerators on each path and stores these selected paths (Smith, Col. 6, lines 26-33). In particular, regenerator placement module groups the paths into 'm' sets by the number of 'k' regenerators that are on the path (Smith, Fig. 4A, step 63, Fig. 5B, Col. 10, lines 53-67). In the example illustrated by Fig. 5B, there is one set with one path having one regenerator (k=1), a second set of three paths with two regenerators (k=2), and a third set of one path having one regenerator (k=3) (Smith, Fig. 5B, Col. 10, lines 54-59). In addition, Smith discloses computing the costs of paths (Smith, Fig. 6B, Col. 13, lines 49-54). If a path is selected, the routing module "destroys the stored paths," as these paths are no longer needed (Smith, Figure 3B, step 20, Col. 8, lines 57-60). However, Smith does not disclose the organizational structure of the network topology database nor does Smith suggest using the stored paths as a replacement for the topology database. Thus, Smith discloses allocating a path

between one source and one destination node by finding multiple paths between these nodes and selecting the best path based on cost and regenerator level.

Applicant respectfully submits that the combination of Ho and Smith do not teach or suggest Applicant's claims. The Examiner admits that Ho does not teach or suggest a "grouping paths based on common destination nodes" and relies on Smith to supply the missing element (October 22, 2007 Office Action Response, p. 2). However, the section cited by the Examiner as disclosing this element merely discloses organizing different paths by destination from one source node to one destination node by the number of regenerators in the path (Smith, Fig. 5B) or by path cost (Smith, Fig. 6B). Neither Smith's Fig. 5B/6B nor Smith's search tree teaches or suggests that these constructs could be used for organizing paths from one source node to more than one destination node. In addition, Smith's search tree is organized by regenerator level and not common destination. Furthermore, Smith does not disclose the organizational structure of Smith's network topology database. Thus, Smith does not teach or suggest possible end to end paths to reachable destinations that are grouped together under that reachable destination node and that there are at least two different groups of available paths to two different reachable destination nodes.

In addition, it would not be obvious to one of skill in the art to modify Ho and/or Smith to have possible end to end paths to reachable destinations grouped together under that reachable destination node with at least two different groups of available paths to two different reachable destination nodes. In order to support an obvious rejection, the Examiner must show that the difference between the prior art cited and the claimed invention would have been obvious to one of skill in the art (Fed. Reg. Vol. 72, No. 195, p. 57528). It would not be obvious to one of skill in the art to modify Smith to organizing multiple paths to multiple destinations with the multiple paths grouped by common destination, because Smith actually teaches away from this limitation. This is because Smith actually discloses destroying the stored multiple paths to one destination stored for path allocation once one of those paths has been allocated (Smith, Figure 3B, step 20, Col. 8, lines 57-60). Thus, as Smith actually teaches away organizing multiple paths to multiple destinations, with the multiple paths grouped by common destination, it would not be obvious to one of skill in the art to modify Smith.

In addition, organizing a topology database with possible end to end paths to reachable destination under that destination would not have been obvious modification to one of skill in the art. As above, the Examiner must show that the difference would have been obvious to one of skill in the art. One example of one of skill in the art can be found in the well-known Open Shortest Path First (OSPF) protocol. In OSPF, the topology database is organized as a link state database for every node in known in the network (See, e.g., Moy, "OSPF Version 2", RFC-2328, pp. 18-21; and Applicant's specification, paragraph 16). With this database, a node generates a shortest path first (SPF) tree representing paths from the source node to other destinations (Moy, p. 21-23). When used for optical networking, this SPF tree is at the individual link and lambda levels because there are multiple lambdas per link and different lambdas may provide different characteristics (Applicant's Specification, paragraph 16). Using this SPF tree, the node selects a path to route (Moy, p. 21). It should be noted that the since OSPF is a protocol typically used in optically networking to create topology databases, Moy would be considered one of skill in the art. Furthermore, even though it was known at the time of Moy that a database may be organized in a different fashion, Moy (and other who use OSPF) chose to organize the topology database as a link/lambda state database and/or a link/lambda SPF tree, instead of a topology database with paths grouped together under each destination. Thus, because Moy organized the OSPF database(s) differently than Applicant's topology database and Moy is one of skill in the art, it would not have been obvious to one of skill in the art to try and organize the topology database with paths grouped together under each destination.

Furthermore, organizing a topology database with paths group to a destination leads to results that would not have predicted. A demonstration of a modification that leads to predictable result can be basis for obviousness (Fed. Reg., Vol. 72, No. 195, 57529, Rationales (A)-(D)). However, a topology database organized by paths grouped to a destination allows a more efficient search for paths than a database and/or SPF tree as used with OSPF. OSPF uses $O(N^2)$ algorithms to search for path, whereas a path grouped topology can be search for a path using $O(\log N)$ algorithms, with N being smaller in the latter case for the same size network (Applicant's Specification, paragraphs 128-129). For example, the number of operations to search an SPF tree representing a network of 10

nodes, eight fibers/node, and 40 wavelengths/fiber is approximately 3210^2 (*Id.*). In contrast, searching the same network using the path grouped topology database requires approximately log(640) operations, which is much more efficient than for OSPF (*Id.*). Thus, this topology database organization is much more efficient than others known in the art. Therefore, a topology database with paths group to a destination leads to results that would not have predicted.

Thus, neither Ho nor Smith teach or suggest possible end to end paths to reachable destinations that are grouped together under that reachable destination node and that there are at least two different groups of available paths to two different reachable destination nodes. Nor is it obvious to one of skill in the art to modify Ho and/or Smith to have such a topology database.

For example, claim 1, as amended, requires "optical network devices acting as access nodes each including a network topology database representing the possible end to end paths, with costs, from that access node to the all other reachable destination nodes, each of said paths having associated with it in said database the wavelengths available on that path, wherein the possible end to end paths in each of said databases are organized such that all available paths to each of the reachable destination nodes are grouped together under that reachable destination node, and wherein at least one of said databases stores at least two different groups of available paths to at least two different reachable destination nodes."

Claim 14, as amended, requires a network topology database to store a representation of paths from the access node to all other reachable access nodes in said optical network as destinations, wherein said representation to separately store the following, a destinations structure to store each of said destinations in a single entry, each of said destination's single entry to reference paths to that destination, wherein each of said paths is represented in said database by a cost and the series of nodes and interconnecting links over which that path travels, and wherein said database stores at least two different groups of paths to at least two different reachable access nodes, and the sets of available wavelengths wherein each of said paths to reference a set of wavelengths available on that path..."

Claim 33, as amended, requires "...a network topology database, to be built responsive to receiving response messages carrying determinations of possible end to end paths having the access node as the source node, to store the possible end to end paths, with costs, from the access node to all other reachable destination nodes, wherein the possible end to end paths in said database are organized such that all available paths to each of the reachable destination nodes are grouped together under that reachable destination node, and wherein said database stores at least two different groups of available paths to at least two different reachable destinations..."

Claim 60 requires "a network topology database to store available paths, with costs, from that access node to all other reachable destination nodes in said optical network, wherein each of said available paths is a series of nodes and interconnecting links in said optical network over which that path travels, said database to store the available end to end paths organized such that all of the available paths to each of the reachable destination nodes are grouped together under that reachable destination node with the all of the available paths sorted in each group at least in part by cost, each of said available paths having associated with it in said database the wavelengths available on that path, wherein allocated and unallocated wavelengths are considered available wavelengths, wherein the set of wavelengths on an available path includes at least those wavelengths common on all of the links of that available path, and wherein said database to store at least two groups of the available paths to at least two different destinations."

Claim 66 requires "...accessing a network topology database storing available paths, with costs, from the access node to all other reachable destination nodes in said optical network, wherein each path is a sequence of nodes and interconnecting links starting at said access node and ending at one of said reachable destination nodes, the available paths in the database are organized such that all of the available paths to each of the reachable destination nodes are grouped together under that reachable destination node sorted in each group at least in part by the cost, each of said available paths having associated with it in said database the wavelengths available on that path, wherein allocated and unallocated wavelengths are considered available wavelengths, wherein the set of wavelengths on each of the available paths includes at least those wavelengths

common on all of the links of that available path, and wherein said database stores at least two groups of the available paths to at least two different destinations ..."

Claim 70, as amended, requires "...locating a reachable destination node in a structure of a database, wherein said structure stores a non-duplicative set of the plurality of destination nodes in the optical network, wherein said database stores at least two groups of the available paths to at least two different reachable destinations, wherein each of said plurality of reachable destination nodes in the structure references each of the sequences of nodes and interconnecting links of those of the available paths that lead to that destination node and the all of the available paths in each group sorted at least in part by cost, each such available path having associated to it the set of one or more available wavelengths along that path to here..."

Claim 76 requires "...storing in a database the collected end to end paths, the collected end to end paths organized in the database such that all available paths to each of the destination nodes are grouped together under that destination node, and the database stores at least two groups of the available paths to at least two different destinations ..."

The above quoted limitations are not described or suggested by Ho and/or Smith. While there are various uses for the invention as claimed, several such uses are discussed at Figures 3-4 and paragraphs 85-90. Thus, while the invention is not limited to the uses discussed on these pages, it should be understood that Ho and Smith do not enable these uses and the above quoted limitations do.

For at least these reasons, Applicant respectfully submits that the claims discussed above are allowable. The Applicant respectfully submits that the additional dependant claims are allowable for at least the reason that they are dependent on an allowable independent claim.

Claims 8-10, 21-23, 40-42, 45-51, 53-55, 62-64, 68-69, 71-72, 80-86, and 88 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Smith, and Ho et al., ("A Framework for Service-Guaranteed Shared Protection in WDM Mesh Networks", IEEE Communications Magazine, February 2002) ("Ho2"). Applicant respectfully

submits that the combination does not teach each and every element of the invention as claimed in claims 8-10, 21-23, 40-42, 45-51, 53-55, 62-64, 68-69, 71-72, 80-86, and 88.

Ho2 discloses a framework for end-to-end service-guaranteed shared protection in dynamic wavelength division (WDM) mesh networks (Ho2, Abstract). Each working path is divided into several overlapped protection domains, where each protection domain has a working and protection path pair (Ho2, p.99, 2nd column). Restoration of paths is done within a protection domain when needed instead of using a path-long protection path (Ho2, p. 99, 2nd column). Nevertheless, Ho2 does not disclose the organization of the databases used to implement this domain-based protection scheme.

Applicant respectfully submits that the combination of the access nodes of Ho and Ho2 would not teach or suggest Applicant's claims 8-10, 21-23, 40-42, 45-51, 53-55, 62-64, 68-69, 71-72, 80-86, and 88. Independent claims 45 and 84 are directed towards a database that stores available paths grouped by common destination. As per above, neither Ho nor Smith teach or suggest the possible end to end paths to reachable destinations that are grouped together under that reachable destination node and that there are at least two different groups of available paths to two different reachable destination nodes. Furthermore, because Ho2 does not disclose the database organization, Ho2 cannot teach or suggest possible end to end paths to reachable destinations that are grouped together under that reachable destination node and that there are at least two different groups of available paths to two different reachable destination nodes.

For example, claim 45, as amended requires "...a network topology database that stores representations of possible end to end paths from the access node to all other reachable access nodes in the optical network as reachable destination nodes, wherein the possible end to end paths in said database are organized such that all available paths to each of the reachable destination nodes are grouped together under that reachable destination node, each such available path having associated to it a path channel set that includes one or more wavelengths common to all of the interconnecting links of that path, and wherein said database stores at least two groups of available paths to at least two different destinations..."

Claim 84 requires, as amended, requires "...a database that stores available paths with costs from the access node to a plurality of reachable destinations, wherein the

available paths are organized in said database such that all of the available paths to each of the reachable destination nodes are grouped together under that reachable destination node..."

The above quoted limitations are not described or suggested by Ho, Smith, and/or Ho2. While there are various uses for the invention as claimed, several such uses are discussed at Figures 3-4 and paragraphs 85-90. Thus, while the invention is not limited to the uses discussed on these pages, it should be understood that Ho, Smith, and/or Ho2 do not enable these uses and the above quoted limitations do.

For at least these reasons, Applicant respectfully submits that the claims discussed above are allowable. The Applicant respectfully submits that the additional dependant claims are allowable for at least the reason that they are dependent on an allowable independent claim.

Claims 5, 18-19, 34, and 37 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Smith, and Deo et al., "Graph Theory with Applications to Engineering and Computer Science"). Claims 13 and 28 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Smith, and Jukan et al. ("Constraint-Based Path Selection Methods for On-Demand Provisioning in WDM Networks", IEEE INFOCOM, 2002). Claims 30, 32, and 44 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Smith, and Moy ("OSPF Version 2", RFC 2328, IETF, April 1998). Claim 31 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Smith, and Pulkkinen et al., U.S. Patent Publication No. 2003/0172356. Claims 52 and 59 stand rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Ho2, Smith, and Deo. Claim 58 stands rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Ho2, Smith, and Moy. Claim 56 stands rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Ho2, Smith, and Jukan. Claims 15 and 61 stands rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Deo, Smith, and Date ("An Introduction to Database Systems" by C.J. Date, Addison-Wesley 1986). Claim 75 stands rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Ho2, Smith, and Shami ("Performance Evaluation of Two GMPLS-Based Distributed Control and Management Protocols for Dynamic Lightpath Provisioning in Future IP Networks", IEEE, 2002).

Claim 87 stands rejected under 35 U.S.C. § 103(a) as being obvious in view of Ho, Ho2, Smith, and Shami.

All of the above claims depend from one of the above identified independent claims. It is respectfully submitted that the above identified cited references, individually or in combination, fail to disclose or suggest the limitations set forth the above independent claims.

SUMMARY

Applicant respectfully submits that the rejections have been overcome by the amendments and remarks, and that the Claims as amended are now in condition for allowance. Accordingly, Applicant respectfully requests the rejections be withdrawn and the Claims as amended be allowed.

Invitation for a telephone interview

The Examiner is invited to call the undersigned at 408-720-8300 if there remains any issue with allowance of this case.

Charge our Deposit Account

Please charge any shortage to our Deposit Account No. 02-2666.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR & ZAFMAN

Date: 3/21/08

Eric Replogle
Reg. No. 52, 161

12400 Wilshire Boulevard
Seventh Floor
Los Angeles, California 90025-1026
(408) 720-8300